International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 10 Special Issue: | Apr 2023 www.irjet.net p-ISSN: 2395-0072

International Conference on Recent Trends in Engineering & Technology- 2023 (ICRTET-3)
Organised by: VSM College of Engineering, Ramachandrapuram

DESIGN & FABRICATION OF POWER GENERATION FROMSPEED BREAKER

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ABSTRACT

Energy is the primary need for survival of all organisms in the universe. In this fast moving world, population is increasing day by day and the conventional energy sources are lessening. The extensive usage of energy has resulted in an energy crisis over the few years. Therefore to overcome this problem we need to implement the techniques of optimal utilization of conventional sources for conservation of energy. This project includes how to utilize the energy which is wasted when the vehicles passes over a speed breaker. Lots of energy is generated when vehicle passes over it. We can tap the energy generated and produce power by using the speed breaker as power generating unit. The kinetic energy of the moving vehicles can be convertedinto mechanical energy of the shaft through rack and pinion mechanism. Then, this mechanical energy will be converted to electrical energy using generator which will be saved with the use ofa battery. The energy we save during the day light can be used in the night time for lighting streetlights. Therefore, by using this arrangement we can save lot of energy which can be used for the fulfillment of future demands.

KEYWORDS:- Speed breaker , Spring, Rack & Pinion, Generator , Bulb..

1.1 INTRODUCTION

Electricity is one of the most widely used form of energy. Today also there is great scarcity of electricity. In this study an innovative concept of Generating Electricity from moving vehicles is presented i.e. electricity generation by using rack & pinion mechanism through speed breaker. Producing electricity from a speed breaker by using rack & pinion mechanism is a new concept that is undergoing research. The number of vehicles on road is increasing rapidly and if we convert some of the kinetic energy of the vehicle into the rotational motion of generator then we can produce considerable amount of electricity, this is the main concept of this project. Today our whole life style is dependent on electricity. With the increasing population the use of electric power is also increasing. But we know that the resources to generate electricity are limited, and this has lead to the energy crisis. During this scenario we need to generate electricity from the things used in day-to-day life. In this project the speed breakers present on roads are used to generate electricity. As we know that vehicles on road are increasing day by day which will help us to generate electricity as these vehicles pass through the speed breakers. This generated electricity can be used for different purpose such as lighting of signals and streetlights on road etc.

2.1 LITERATURE REVIEW

[1] R. MANASA VEENA ; B. HARIKA REDDY ; S.M. SHYNI The root aim of this project is to harvest utmost energy from electromagnetic micro generators. Most electromagnetic generators uses the process of electromagnetic induction while some of these use renewable energy sources such as water power and wind power to create the initial mechanical energy. This project uses the principle of electromagnetic induction and converts the pressure energy into the electrical energy. The control mechanism carries the copper coil and bar magnetic to generate voltage, and a rechargeable battery is used to store this generated voltage. The idea is to utilize the unused energy released by footsteps at populated places such asroads, railway stations, temples and busstops.

[2] DAIFALLAH DALABEIH; BATOOL HAWS; SAWSAN MUHTASEB This paper introduces an exploratory model for utilizing the kinetic energy of footsteps. The model consists of three wood layers. The bottom and top layer having the same dimensions are connected through springs. A practical examination was performed at the University of Jordan to compute the expected energy generation if commercial tiles are lodged. The thought of generating electricity basically started from South Africa, where, a businessman felt the need for a generation of electricity

without compromising on any resources. For this purpose, he thought of an idea and also brought into existence, the working model of this idea. His idea was to generate electricity using speed breakers. These speed breakers use the concepts of physics to convert the kinetic energy possessed by the vehicles running on the road into electrical energy, eventually generating electricity. This is where the plot for energy generating speed breakers was laid, later on, IIT Guwahati took over this project to overcome its limitations. The practical implementation of the electricity generating speed breaker has been very less and the result of the few places where it is implemented is still not known. Although, there have been many surveys to support the implementation of this idea. One such survey was done by the Tamil Nadu electricity board. According to this survey, the electricity consumed by a remote village for 45 days is equal to the electricity consumed by all the street lights in one night in Chennai city. By this scenario, we can get an idea of the rate by which electricity is being consumed in India, also, this consumption rate is increasing day by day. Electricity and power can be called as the backbone for development and modernization of the country and therefore, the rapid speed of development has lead to a constant increase in the rate of electricity consumption.

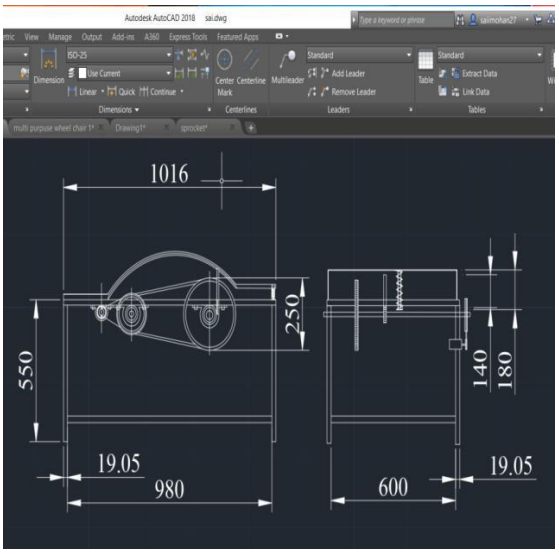
3. DESIGN & FABRICATION

3.1 COMPONENTS SELECTION OF RAWMATERIALS

S.NO	COMPONENTS	QTY
1	Square Rods	11
2	Shafts	2
3	Spring	1
4	Rack and pinion	1
5	Bearing	4
6	Pulley	2
7	D.C. Generator motor(6v- 12v)	1
8	U-clamps	5
9	Sprockets	2
10	Chain	1
11	Flat belt drive	1
12	Nut and bolts	11
13	Screws	13
14	Galvanized iron sheet	1
15	Bulb	5

3.2 Introduction ToV.O.49.0.0 AUTOCAD 2018

The term **CAD (Computer Aided Design)** applies to a wide range of programs thatallow th user to created drawings, plans, and designs electronically. AutoCAD is one such program and it main claim to fame is that it is relatively easy to use, it is very comprehensive in its ability to create 2D and some 3D drawings, and it is very popular. Seventy percent of the CAD users in the world use AutoCAD.



DIMENSIONING IN DRAWINGS:

The dimensions are inserted in the drawing by use of DIM command. There are various types of dimensions used in AutoCAD.

Linear dimensions:

Horizontal- this allows horizontal dimensions

Vertical- this allows vertical dimensions

Aligned- this allows inclined dimensions

Rotated- this allows inclined dimensions

ASSEMBLING PROCESSCUTTING PROCESS

Cutting processes work by causing fractureof the material that is processed. Usually, the portion that is fractured away is in small sized pieces, called chips. Common cutting processes include sawing, shaping (or planning), broaching, drilling, grinding. and milling. Although the actual machines, tools and processes for cutting look very different from each other, the basic mechanism for causing the fracture can be understood by just a simple model called for orthogonal cutting. In

all machining processes, the work piece is a shape that can entirely cover the final.

DRILLNG PROCESS

Drilled holes are characterized by their sharp edge on the entrance side and the presence of burrs on the exit side (unless they have been removed). Also, the inside of the hole usually has helical feed marks. Drilling may affect the mechanical properties of the work piece by creating low residual stresses around the hole opening and a very thin layer of highly stressed and disturbed material on the newly formed surface.

WELDING PROCESS

Introduction to welding process Introduction Welding is a process in which two or more parts are joined permanently at their touching surfaces by a suitable application of heat and/or pressure. Often a filler material is added to facilitate coalescence. The assembled parts that are joined by welding are called a weldment. Welding is primarily used in metal parts and their alloys. Welding processes are classified into two major groups: 1. Fusion welding: In this process, base metal is melted by means of heat.

GRINDING OPERATION

Grinding practice is a large and diverse area of manufacturing and tool making It I can produce very fine finishes and very accurate dimensions; yet in mass production contexts it can also rough out large volumes of metal quite rapidly. It is usually better suited to the machining of very hard materials than is "regular" machining (that is, cutting larger chips with cutting tools such as tool bits or milling cutters), and until recent decades it was the only practical way to machine such materials as hardened steels. Compared to "regular" machining, it is usually better suited to taking very shallow cuts, such as reducing a shaft's diameter by half a thousandth of an inch or 12.7 um.

SOLDERING

Soldering, is a process in which two or more items (usually metal) are joined together by melting and putting a filler metal (solder) into the joint, the filler metal having a lower melting point than the adjoining metal. from welding in that soldering does not involve melting the work pieces. In brazing, the Soldering differs filler metal melts at a higher temperature, but the work piece metal does not melt. In the past, nearly all solders contained lead, but environmental and health concerns have increasingly dictated use of lead-free alloys for electronics and plumbing purposes.

WORKING AND DISCUSSION

As a result of this project, we designed and fabricated the power generation from speed breaker. Now it is in working condition. By this project we discover technology to generate electricity from speed breaker .In coming days this will give a great boon to the world. This generates power by using downward and upward motion of rack with the help of speed breaker. Reciprocating motion of the rack is converted into rotary motion of pinion and that is used to rotate the shaft of DC generator.

The following is the estimated power developed value,

The bike passes over the speed breaker with the weight of 100kg and height of the speed breaker is 17cm.

Estimated power calculations

$$\text{Power, } P = \frac{2\pi NT}{60}$$

Where

N = No. of revolutions per stroke = 8
T = Torque required to drive the shaft
Height = 17cm = 0.17m
Weight = 100kgs
Torque = Load x perpendicular distance
T = 100 x 0.17
T = 17 N-m

$$\text{Power, } P = \frac{2\pi NT}{60} = \frac{2\pi \ x \ 8 \ x \ 17}{60}$$

P = 14 watts

ADVANTAGES

- Power generation with low cost and using non-conventional energy sources which will help us to conserve the conventional energy sources to meet thefuture demand.
- By using this method, electricity will be generated throughout the year without depending on other factors.
- Easy for maintenance and no fuel transportation problem.
- No consumption of any fossil fuel which is non-renewable source of energy.
- Pollution free power generation.
- Less floor area required and no obstruction to traffic.
- No need of manpower during powergeneration.
- Simple construction, mature technology and easy maintenance.

APPLICATIONS

- Street lights.
- Road signals.
- Lighting of the check posts on highways.
- Entering and exiting of schools, hospitals,industries.

DISADVANTAGES

- We have to check mechanisms from timeto time.
- It can get rusted in rainy season.

CONCLUSION

This project work has provided us an excellent opportunity and experience, to use our limited knowledge. We gained a lot of practical knowledge regarding, planning, purchasing, assembling and machining while doing this project work. We feel that the project work is a good solution to bridge the gates between the institution and the industries.

We are proud that we have completed the work with the limited time successfully. The fabrication of power generation from speed breaker is working with satisfactory conditions. We can able to understand the difficulties in maintaining the tolerances and also the quality. We havedone to our ability and skill making maximum use of available facilities.

"Electricity plays a very important role in our life". Due to population explosion, the current power generation has become insufficient to fulfill our requirements. In this project we discover technology to generate electricity from speed breakers in which the system used is reliable and this technique will help conserve our natural resources. In coming days, this will prove a great boon to the world, since it will save a lot of electricity of power plants that gets wasted in illuminating the street lights. As the conventional sources are depleting very fast, it‟s high time to think of alternative resources. We got to save the power gained from the conventional sources for efficient use. So this idea not only provides alternative but also adds to the economy of the country.

FUTURE SCOPE

The future scope of this project is to improve the sustainability of the speed breakers that is by using various materials for the manufacturing of speed breakers. Suitable at parking of multiplexes, malls, toll booths, signals, etc. Such speed breakers can be designed for heavy vehicles, thus increasing input torque and ultimately output of generator. More suitable and compact mechanisms to enhance efficiency.

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